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ON

VERTICAL BUBBLE DISPENSING DEVICE

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VERTICAL BUBBLE DISPENSING DEVICE

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to bubble making and more particularly to a machine for making soap bubbles that are dispersed in a generally vertical manner.

Description of the Related Art

Bubbles made of a solution of water and soap or detergent are well known in the art, as are means by which bubbles can be produced.

Many people are familiar with the standard child's toy of a bottle of bubble solution having a bubble wand inside. A screw top lid generally keeps the wand and solution closed in the bottle, and when the child or the person wants to blow bubbles, the lid is unscrewed, the wand is removed, and the person's breath is blown through the ring, or loop, formed by the bubble wand. The bubble solution membrane adhering to the teeth of the toothed ring circumscribing the bubble wand is then stretched with the blowing breath and forms bubbles that fly away from the bubble wand. Generally, a membrane is formed across the bubble ring of the bubble wand when it is extracted from the bubble solution. If this is not so, bubbles do not form and the wand must be dipped again into the bubble solution. With practice, bubbles of several sizes may be blown from the bubble wand. The wand itself generally has a handle so that the ring may be dipped in the bubble solution without getting additional soap on the child's fingers.

Other bubble making devices are generally variations on this theme where a vertically-disposed bubble ring is supplied with bubble solution, a serrated or toothed extension extends from the bubble ring to provide additional surface area, and the initial membrane formed across the bubble ring serves as the source for bubbles when air is blown through the ring. The bubbles are generally blown horizontally from a vertically-disposed bubble ring.

This is generally the basis for a variety of devices, including a pumpkin bubble blower, Item No. 35917 of the 2001 Johnson Smith catalog where a vertical ring of several such bubble rings is rotated through a reservoir of bubble solution. A squirrel cage or other type of fan then blows air through individual rings as they travel above the reservoir and past the fan. The limited amount of soap that each of the rings can hold is then exhausted and the ring is returned into the reservoir by circular rotation. The fan is then focused upon the next bubble ring and proceeds to blow bubbles from it.

U.S. Patent No. 5,879,218 issued to Tao and assigned to Cap Toys, Inc. for a Bubble Apparatus and Method issued March 9, 1999, has a bubble making apparatus for producing bubbles from a gun like device. Bubbles are expelled from one aperture while an additional air blowing aperture serves to disperse the bubbles away from the opening to the bubble aperture.

U.S. Patent No. 4,764,141 issued to D'Andrade on August 16, 1988, for a Toy Bubble Blowing Machine has a housing that may simulate a motor and may be mounted on a rideable toy such as a bicycle or automobile. A bubble wand with a plurality of wand heads share a central hub, and a Geneva mechanism is used to sequentially rotate each of the wand heads through bubble solution and forced air in sequence.

Other machines and devices are known in the art. Many of these blow bubbles in a horizontal, and not a vertical, direction. Blowing bubbles in a vertical direction is generally

not possible with these systems, as the bubble heads must be rotated through a horizontal reservoir of bubble solution and consequently must be orthogonal, or at a right angle, to such bubble solution. Tilting the machine as a whole into an upright direction would generally spill the bubble solution out of the reservoir, thereby eliminating the source of bubble solution for future bubbles from the bubble machine.

Consequently, it would be an advance in the art to provide means by which bubbles could continuously be produced and blown vertically from an on-going bubble machine. Such a device would preferably be easy to use, easy to clean, and very reliable in that it would only function if properly assembled and would cease to function if tipped over.

The present invention as set forth herein solves many of the problems present in the prior art, as well as providing additional advantages and benefits that have heretofore not been seen.

SUMMARY OF THE INVENTION

The present invention provides a machine for making soap bubbles that are dispensed and dispersed in a generally vertical manner. This is in distinction to prior art devices, which generally dispense their bubbles in a horizontal fashion.

A fan is used to blow air upwardly through a housing, which is generally closed by two flaps when air is not blown by the fan. The flaps enjoy hinged attachment with the top of the housing and are generally flush with that top. The flaps are generally light in nature so that they may be forced open by the fan-blown air. The flaps generally fit within the inner perimeter of the housing end and each has membrane-forming rings at one end. These rings engage bubble-making rings that have circumscribing toothed rings acting as bubble stabilizers.

In order to initially form a membrane across the bubble ring, the membrane-forming rings come into contact with the bubble rings and the bubble solution held in a bubble ring channel associated with the bubble rings. When withdrawn from a bubble ring, the membrane-forming ring takes bubble solution with it causing a bubble solution membrane to form over the bubble ring. The membrane formed across the bubble ring is then subject to the air blown by the fan, which has sufficient force or pressure to blow bubbles from the bubble rings.

The flaps extend upwardly from the housing and direct the blown air and the bubbles away from the bubble-making machine. While the bubble rings are continuously supplied with bubble solution from a central reservoir, the membrane sometimes ruptures and the creation of bubbles ceases, even though there is bubble solution in the bubble ring channel and air is blowing from the fan. In order to continually create a membrane across the bubble rings, the fan is intermittently turned off so that the flaps may descend towards the housing and the membrane forming rings may engage the bubble solution in the bubble ring channel. The fan then starts to blow, lifting the flaps and the membrane-forming rings, forming a membrane across the bubble ring, and creates additional bubbles.

The housing may be connected to a fan framework by a bayonet connection, and four "AA" batteries may power an intermittent timing circuit to control the intermittent operation of the fan. A standard bubble solution container often purchased at toy stores and elsewhere is fitted with a special self-closing lid that fits over a float cage to allow flow of the bubble solution into the reservoir. Vacuum pressure, much in the same way as a water dispenser, keeps the bubble solution in the bottle. The presence of bubble solution in the reservoir causes a magnetic float to lift from the bottom of the reservoir. The floating of the magnetic float closes a switch in the intermittent circuit enabling the fan to turn on. Additional switches in

the intermittent circuit allow coupling of the circuit to the housing so that the proper attachment of the housing to the fan's framework is detected by the intermittent circuit. Finally, a tip-over switch is present in the intermittent circuit which when open (indicating a tip-over condition) ceases operation of the fan.

In this manner, a bubble machine dispensing bubbles in a vertical manner may be manufactured and produced in a cost-efficient, highly useful, and very efficient manner. Additionally, the enjoyment and/or merriment that can be elicited by the accompaniment of bubbles is better provided, and individuals or circumstances complemented by such activity are more easily achieved.

OBJECTS OF THE INVENTION

It is an object of the present invention to provide a bubble machine.

It is yet another object to provide a bubble machine that creates and dispenses bubbles in a vertical manner.

It is yet another object of the present invention to provide a bubble machine that can continually create bubbles, although a membrane is temporarily absent from a bubble ring.

It is yet another object of the present invention to provide a continual supply of bubble solution to bubble rings creating vertically-dispersed bubbles with reduced leakage.

It is yet another object of the present invention to create a bubble machine that is easily cleaned.

It is yet another object of the present invention to provide a bubble machine that requires little monitoring during operation.

These and other objects and advantages of the present invention will be apparent from a review of the following specification and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a top side perspective view of the bubble machine of the present invention with the flaps closed.

Figure 2 is a top side perspective view of the bubble machine of Figure 1 with the flaps open and bubbles being created from the bubble rings.

Figure 3 is a cross-section view of the bubble machine in Figure 1 taken along line 3-3.

Figure 4 is a close-up view of the bubble ring channel, and membrane-forming ring shown in circle 4 of Figure 3.

Figure 5 is an exploded view of the bubble machine shown in Figure 1.

Figure 6 is an electronic circuit schematic of the intermittent circuit used to control the fan and sense proper assembly and disposition of the bubble machine in Figure 1.

Figure 7 is a top side perspective view of component silhouettes used to construct the circuit shown in Figure 6 and used to control the intermittent activity of the fan.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

The detailed description set forth below in connection with the appended drawings is intended as a description of presently-preferred embodiments of the invention and is not intended to represent the only forms in which the present invention may be constructed and/or utilized. The description sets forth the functions and the sequence of steps for constructing and operating the invention in connection with the illustrated embodiments. However, it is to be

understood that the same or equivalent functions and sequences may be accomplished by different embodiments that are also intended to be encompassed within the spirit and scope of the invention.

As shown in Figure 1, the bubble machine **100** of the present invention is used to create bubbles **102** from bubble solution held in the refillable bottle **104**. The refillable bottle **104** is held in the central reservoir **106** that communicates the bubble solution to the bubble rings **108**. The bubble rings **108** are also known and referred to as bubble loops **108**. The refillable bottle **104** operates on a known principle of inverted bottle delivery systems and is described in more detail, below. Generally, the bubble solution is a solution of soap or detergent, but other solutions or liquids may be advantageously used in the present invention.

A central housing **120** directs air blown from a fan (Figure 5) **122** upward towards the bubble rings **108**. Flaps **124** are coupled by hinges **126** to the housing **120**. Each of the flaps **124** has a membrane-forming ring **128** that engages a bubble ring channel **250** (Figure 4) present in the bubble ring **108**.

When the fan **122** is controllably and intermittently activated, air is blown into and through the housing **120** and onto the flaps **124**. The flaps are of sufficient weight to close when air is not blowing past them, but readily open when the fan **122** blows air through the housing **120**. When bubble solution is present in the associated bubble rings **108** and the associated bubble ring channels, and the flaps **124** pivot away from the bubble rings **108** upon the hinges **126**, the bubble solution adhering to the membrane-forming rings **128** causes the membrane to form across the bubble rings **108**. The membrane formed across the bubble rings **108** serves as the origin for the bubbles **102** that form when air is blown through the bubble rings **108**. As the membrane may be ruptured from time to time, the intermittent activity of

the fan **122** periodically allows the flaps **124** to close across the top of the housing **120**. This causes the membrane-forming rings **128** to engage the bubble rings **108** and their bubble ring channels to recreate the membranes across the bubble rings **108** once the fan **122** begins again to blow air through the housing **128**.

Figure 2 shows the formation of bubbles **102** from a membrane **130**. Note should be taken with respect to the angle that the flaps **124** take with respect to the housing **120**. It has been found that by allowing the flaps **124** to pivot upon the hinges **126** to a nearly vertical position forces the bubbles **102** generally to strike the refillable bottle **104**. Consequently, the flaps **124** are disposed so that they are at an acute angle with respect to the top of the housing **120**. This angled disposition of the flaps **124** serves to direct the air blown by the fan **122** away from the bubble-making machine **100** and into the adjoining area.

Note should also be taken that the housing **120** generally enjoys a bayonet-type of connection **140** with a portion of the fan framework system **122**.

Figure 5 shows an exploded view of the bubble-making machine of the present invention. Note should be taken that the view shown in Figure 5 is only one embodiment of the present invention and many alternative embodiments may be achieved with respect to the membrane-forming aspects of the present invention, such as the membrane-forming rings **128**, as well as the circuitry or mechanism causing the intermittent formation of a membrane **130** across the bubble rings **108**.

As is shown in Figure 5, the bubble-forming machine **100** has a drip tray **150** in which the fan **122** may sit. The legs **152** of the fan **122** may fit into sockets **154** from which the legs **152** are removed with some effort, but the legs **152** are generally not permanently attached to

the sockets **154** in order to allow for easy cleaning of the drip tray **150**. The fan **122** generally has a substantial chassis **160** that encloses a fan blade **162** attached to a motor (not shown). To protect the fan blade **162** from objects and such objects from the fan blade **162**, a protective grillwork **164** is attached to the top of the fan chassis **160**.

To promote a modular construction technique as well as providing for an attractive appearance, the batteries, motor, and intermittent circuit are centrally disposed above the fan **122** in a central pillar **170**. This central operation pillar **170** is generally less than the height of the housing **120** and is protected by a pillar cover **172**. Preferably, the pillar cover **172** forms a water-tight connection with the fan chassis **160** or grillwork **164** to protect the circuitry **180** (Figure 6 and 7), the batteries (not shown) and the motor (not shown). If such a water-tight connection is present, the detachment of the housing **120** from the bayonet connection with the protective grillwork **164** allows the fan **122** and central operation pillar **170** to be rinsed as under a faucet in an easy and convenient manner. Generally, while bubble solution is not unsanitary, it is sticky and slick, and people generally prefer to have clean surfaces with which to work. Additionally, the sticky surface of the soap may attract dirt or the like, which over time may become unattractive or distasteful.

The housing **120** may be cylindrical in nature and sit atop the fan chassis **160** as by bayonet connection **140** with the protective grillwork **164** of the fan **122**. The housing **120** is generally hollow save for its opening **182** at its top, where the reservoir **106** is centrally disposed in the opening **182** and held in place there by lateral supports **202**. The reservoir **106** contains small offsetting supports **204** that support the refillable bottle **104** above the surface of the central reservoir **106**. The top of the small offset supports **204** is below the top of the side **206** of the central reservoir **106**.

The small offset supports **204** provide space through which bubble solution from the refillable bottle **104** may flow, yet the opening to the refillable bottle **104** is effectively closed by bubble solution held by the reservoir **106**, as the opening **210** to the refillable bottle **104** is held beneath the surface of the bubble solution in the reservoir **106**, which is held in the reservoir by the side **206** of the reservoir **106**. In the interior of the reservoir **106** are a number of channels **220**, which serve to guide the flow of bubble solution out to the soap bubble rings **108**. They may also provide a support for a float cage **222**, which provides an operating space for a magnetic or other type of float **224**. The height of the float cage **222** is significantly higher than that of the magnetic float **224** to allow it to move upward.

The magnetic float **224** provides an indicator as to the presence of bubble solution in the reservoir **106** and bottle **104**. When the level of liquid is sufficiently high, the magnetic float **224** floats up and away from the bottom of the reservoir **106**. The upward travel of the magnetic float is constrained by the float cage **222**, which prevents the magnetic float **224** from moving away from its central location in the reservoir **106**. The diameter of the float cage **222** is generally sufficiently smaller than that of the bottle opening **210**, so that it can fit through the bottle opening **210** and into the bottle **104**. As is described in more detail below, the float cage **222** serves to open the bottle **104** when it is fitted about the float cage **222** and set into place over the reservoir **106**.

The refillable bottle **104** generally has a threaded end **230**, which threadably engages a lid **232** that has a central opening **210** that acts as the opening to the bottle **104**. A stopper **234** is centrally disposed in the opening **210** to prevent the outflow of bubble solution from the

bottle **104**. The stopper **234** has a central shaft **236** that extends away from the stopper **234** and into the interior of the bottle **104**.

A spring **238** acts against the stopper **234** and a stopper cage **240** which is attached by legs **242** to the lid **232**. A central aperture **244** in the stopper cage **240** allows the travel of the central shaft **236** therethrough and allows the stopper **234** to be displaced by the float cage **222** when the bottle **104** is placed into position upon the reservoir **106**. The spring **238** is generally one that is weak in character or in "springiness." However, it is sufficient to provide an adequate seal for the stopper **234** against the lid **232**. When the bottle is in the upright position, the spring **238** holds the stopper **234** in place against the lid **232**, so that bubble solution does not splash out. The seal that forms between the stopper **234** and the lid **232** is sufficient to prevent the outflow of such bubble solution.

When the bottle **104** is turned upside down (as is true immediately prior of the placement of the bottle **104** upon the reservoir **106**), the biasing force of the spring **238** is further augmented by the weight of the bubble solution. The pressure of the bubble solution upon the stopper **234** additionally increases the closing force present between the stopper **234** and the lid **232**. When the bottle **104** is placed over the float cage **222**, the weight of the bottle **104** with however much or however little bubble solution it has is sufficient to overcome both the biasing force of the spring **238** and the weight of the bubble solution contained in the bottle **104**. The lid of the bottle **232** slips around the float cage **222** until the descent of the bottle **104** is stopped when the lid **232** comes into contact with the small offset supports **204**.

Upon the opening of the stopper **234** from the bottle opening **210** present in the lid **232**, the bubble solution flows out of the bottle **104** until the level of the bubble solution rises to

approximately the level of the opening **210** to the bottle **104**. This level is determined by the small offset supports **204** and is below the height provided by the side **206** of the reservoir **106**. Once the level of the bubble solution of the reservoir **106** rises to the level of the opening **210** to the bottle **104**, air cannot flow into the bottle **104** through the opening **210**. This prevents further outflow of the bubble solution into the reservoir **106**, as such outflow must be replaced by the inflow of another fluid, namely air, into the bottle **104**. This operation is similar to that of a water cooler that maintains a reservoir of water above the level of the opening to the upside-down water bottle. Until the water level outside the opening sufficiently descends below the opening, no outside air can travel into the bottle to allow the outflow of additional water from the bottle.

In operation, the engagement of a bottle **104** with the reservoir **106** as well as the membrane-forming rings **128** with the bubble rings **108** is shown in cross-section, or assembly view, in Figure 3. Close inspection of Figures 3 and 5 will provide an excellent indication of the construction of the present invention.

Critical to the present invention is the manufacturing of bubbles. Without the manufacture of bubbles **102**, the present invention does not achieve its great utility and entertainment value. As a result of long experimentation, the inventor found that bubble formation by the bubble ring **108** would sometimes cease due to rupture of the bubble solution membranes. It then became a challenge to find a way to provide the continuous or on-going creation of bubbles for a vertically-dispensing bubble machine. As mentioned above, many prior devices used horizontal bubble making systems so a bubble ring or wand could be dipped into a bubble solution reservoir. That alternative was not available in the present invention, as there is no way to conveniently dip a bubble wand into a bubble solution reservoir as the

bubble wand has to be disposed in a flat, or horizontal, manner in order to create vertical bubbles.

After much thought and deliberation, the inventor achieved the present invention by creating means that not only periodically re-formed a membrane across the bubble ring **108**, but dispersed the bubbles **102** created by the bubble ring **108** away from the bubble machine **100**, so that the bubble machine **100** itself did not cause the destruction of the bubbles it made.

Turning now to Figure 4, an enlarged cross-section of the bubble ring shown in Figure 3 at circle 4 indicates the mechanical architecture used to achieve the present invention. The bubble ring **108** has a bubble ring channel **250** connected to the central reservoir **106** by a bubble channel arm **252**. The bubble channel arm may be connected or in communication with the reservoir channels **220** and serves as a hollow support by which the bubble rings **108** may be supported as well as supplied with bubble solution from the central reservoir **106**. The bubble solution flows from the central reservoir **106** into the bubble arms **252** and on to the bubble ring channels **250**. Gravity flow is responsible for the communication of bubble solution from the refillable bottle **104** to the reservoir **106** to the bubble rings **108**. Upon encountering the bubble ring channel **250**, the bubble solution distributes itself about the bubble ring channel **250**, which circumscribes the central aperture **254** of the bubble ring.

It can be seen that, while bubble solution is available to the bubble ring **108** when the refillable bottle **104** supplies bubble solution to the reservoir **106**, a means must be present by which a membrane **130** can be formed across the central bubble ring aperture **254**. The membrane-forming ring **128** is that thing which creates the membrane **130**.

When the bubble solution flows into the bubble ring channel **250**, it comes into contact with the surface of the membrane-forming ring **128**. It also comes into contact with all of the

other surfaces of the bubble ring **108** adjacent the bubble solution. These surfaces include the toothed ring **260**, which by surface tension and adhesion serve to lift the bubble solution up from the bubble ring channel **250**. Additionally, when the membrane-forming ring **128** is in place, a seal is formed by contact between the bubble ring **108** and the membrane-forming ring **128** as shown in Figure 4.

Upon coming into contact with the surfaces present in the bubble ring channel **250**, the bubble solution is then ready to be used to form bubbles. Upon activation of the fan, air pressure is increased upon the flap **124** which then lifts up and away from the housing opening **182**, which lifts the membrane-forming ring **128** up and away from the bubble ring **108**. Due to surface tension, bubble solution is drawn away from the top of the bubble ring by the withdrawing of the membrane-forming ring **128** from the bubble ring **108**, thus forming a tubular film of bubble solution between the bubble ring **108** and the membrane forming ring **128**. At some point, this tubular film naturally pinches off forming a closed membrane. Continuous bubble formation occurs as air pressure elongates the membrane to the point where it pinches off forming a spherical bubble and leaving behind a closed membrane. Toothed ring **260** helps stabilize the bubble solution film during this process. Bubble solution in the bubble ring channel **250** lost to bubble egress is replenished by gravitational flow from the central reservoir **106**.

Consequently, the formation of bubbles enables the formation of additional bubbles as the creation of bubbles does not necessarily destroy the membrane **130** present across the central aperture **254** of the bubble ring **108**. Only when that membrane **130** is lost are bubbles no longer created. To prevent interruption of the bubble making process, the flap **124** periodically descends down to the housing opening **182** so that the membrane-forming ring **128**

can engage the bubble ring channel **250** and the bubble solution therein. The process is then repeated with the lifting of the flap **124** and withdrawal of the membrane-forming ring **128** to ensure ongoing creation of a new set of bubbles.

While it is in the contemplation of the present invention to have a sensitive mechanism as to whether or not a membrane **130** is present across the central aperture **254** of the bubble ring **108**, one economy can be achieved by using an intermittent fan system whereby mere timing is used to assure that a membrane **130** is always present across the central aperture **254**. The mechanism to periodically re-establish the membranes **130** may be powered by several batteries and may be either electronic/pneumatic or mechanical in nature. A mechanical system would generally have a number of cams and/or gears and could make the bubble making machine **100** of the present invention more frail, complicated, subject to breakage and/or noisier. Consequently, the electronic circuit embodiment for the control of the fan shown in Figure 6 is currently believed to be a preferable embodiment.

As shown in Figure 6, the fan **122** is showed connected by a relay switch **280** to a timing circuit. A series of three switches **282**, **284**, **286** are shown which control the operation of the fan and the availability of voltage from the battery **288** to the circuit. Capacitor C2, **290** generally controls the operation of a commonly-known 555 timer chip **292**. In order to pre-charge the timing capacitor **290**, a charging circuit **294** is used. As those who have ordinary skill in the art will understand the operation and construction of the circuit set forth in Figure 6, a detailed description is not set forth herein as being redundant and readily available elsewhere. However, the charging circuit **294** charges the capacitor C2/**290** until capacitor C3/**296** is saturated.

In so providing a charging circuit **294**, the duration of the OFF state which would initially result from the connection of the three switches **282**, **284**, **286** is reduced, and the operation of the fan begins much sooner than if the charging circuit **204** were absent.

In combination, resistor R1/**300** and resistor R2/**302** set the ON time for the fan, while the resistance of resistor R2/**302** sets the fan OFF time. In the present invention, a timing series circuitry of initial OFF state of 5 seconds (to provide the initial flow of bubble solution to the bubble rings **108**) is then followed by a series of 8 seconds with the fan ON, 3 seconds with the fan OFF, and so on. The initial pause in the fan's operation after the magnetic float **224** has been lifted from the reservoir **106** is then followed by a regular series of 8 seconds of the fan being ON with 3 seconds of the fan being OFF.

The 3 switches S1/**282**, S2/**284**, and S3/**286** shown in Figures 6 and 7 must all be on in order for the circuitry to be powered and the fan to run. Switch S1/**282** is a tilt switch that is only ON when the central operation pillar is in an upright and vertical position. The second switch S2/**284**, the magnetic float switch, is in an OFF position when the magnetic float **224** rests upon the central reservoir **106**. This magnetic float switch **284** then turns on when the magnetic float **224** floats above the reservoir **106** as when it floats in the bubble solution present in the reservoir **106** and bottle **104**. The third switch S3/**286** is also a magnetic switch that is in the OFF position when the housing **120** has not been properly fitted in bayonet-type connections **140** with the protective grillwork **164**. Two magnets **310** (not shown) are disposed near the top of the housing **120**. The magnets are so disposed that no matter which way the housing **120** is connected to the fan **122**, proper connection of the housing **120** to the fan **122** disposes the magnets **310** in a proper position so as to turn the housing assembly switch S3/**286**

into an ON position. Consequently, not only must the bubble machine **100** of the present invention be in an upright position, but it must also have bubble solution in the reservoir **106** and the housing **120** must be properly connected to the fan **122** in order for the fan **122** to operate.

Figure 7 shows silhouettes of circuit elements actually used to achieve the intermittent timing portion of the circuitry shown in Figure 6.

Many variations on the present invention will be easily achieved by those with ordinary or other skill in the art. Particularly, the membrane **130** may be formed across the bubble rings **108** by wiper or the like in the form of a wire or otherwise as is known in the art. Additionally, a mechanical switch can be used to deactivate the fan upon disassembly with correspondingly proper modifications made to the intermittent circuitry **320** shown in Figure 6 and 7.

While the present invention has been described with regards to particular embodiments, it is recognized that additional variations of the present invention may be devised without departing from the inventive concept. One such alternative embodiment would be to provide a downward cascade of bubbles using the present invention. Instead of the air blowing upwardly through the bubble rings **108**, air could be blown downwardly through a bubble ring and bubble solution supply system as described herein to create a column, a curtain, or an entire fall of bubbles.